

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-255159

(43)Date of publication of application : 13.09.1994

(51)Int.Cl. B41J 2/36  
B41J 2/32  
B41J 2/325

(21)Application number : 05-094831 (71)Applicant : FUJI PHOTO FILM CO LTD

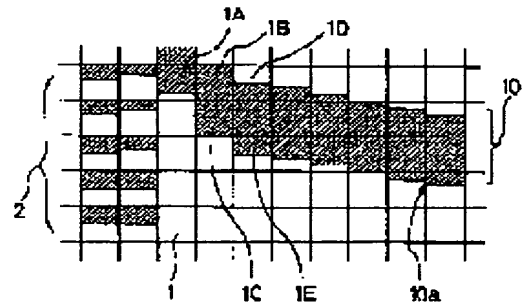
(22)Date of filing : 04.03.1993 (72)Inventor : SAWANO MITSURU

## (54) IMAGE RECORDING METHOD AND ITS APPARATUS

### (57)Abstract:

PURPOSE: To provide an image recording method which can record a high quality gradation image, and besides can record a high resolution character and its apparatus.

CONSTITUTION: A gradation image part 2 carries out gradation expression according to the number of micro lines inside a pixel 1 by taking the pixel 1 as a unit, and a character part 10 can record any micro line according to character information irrespective of the pixel 1. That is, any micro line of each recording pixel can be optionally heated with a heating element of a thermal head according to form information of the character to be recorded on a recording medium. Thereby, difference in level is reduced to become a form near almost a curve between adjacent recording pixels of an oblique part 4 of the character, and the character of high resolution can be recorded.



## LEGAL STATUS

[Date of request for examination] 10.05.1999

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]	3174197
[Date of registration]	30.03.2001
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

Copyright (C); 1998,2003 Japan Patent Office

## \* NOTICES \*

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

---

## CLAIMS

---

[Claim(s)]

[Claim 1] The image-recording approach characterized by to realize area gradation of an image, to select the micro line in each record pixel for each of two or more micro lines in the recording paper conveyance direction at arbitration according to the configuration information on an alphabetic character as a unit pixel in 1 pixel, and to form an alphabetic character by forming 1 pixel with micro line two or more books, and setting up the number of the predetermined micro line in each record pixel according to the concentration information on an image.

[Claim 2] The image recording approach according to claim 1 that record of said image and an alphabetic character part is characterized by what is recorded by thermal recording.

[Claim 3] The image recording approach characterized by realizing area gradation of an image, selecting the micro line in each record pixel in the recording paper conveyance direction at arbitration by making into a unit pixel the number of micro lines smaller than the number of micro lines which forms 1 pixel, and forming an alphabetic character by forming 1 pixel with micro line two or more books, and selecting the number of the predetermined micro line of each record pixel according to the concentration of an image.

[Claim 4] Image recording equipment characterized by consisting of a conversion means to change ON / off setup of a heater element drive of a thermal head on a micro line by whether it is image data or it is alphabetic data, an amendment means to amend the drive time amount of said heater element, and a strobe signal generating means to direct the drive time amount of said heater element.

---

[Translation done.]

## \* NOTICES \*

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

---

## DETAILED DESCRIPTION

---

[Detailed Description of the Invention]

[0001]

[Industrial Application] This inventions are the image recording approaches, such as a thermal paper, a sensible-heat film, thermal-transfer-recording paper, and a thermal-transfer-recording film, and equipment, and relate to the image recording approach and equipment which form 1 pixel for an image part with micro line two or more books in detail, and realize area gradation according to image concentration.

[0002]

[Description of the Prior Art] A thermal recording ingredient is heated using a thermal head as image recording equipments, such as a printer for printing, and a printer for images, and there is a thermal printer of the method which forms images, such as an alphabetic character and a graphic form. When forming an image using the above-mentioned thermal recording ingredient, there are also images enough in Isshiki, such as black, but in order to cope with the request of expressional diversification etc., the thermal recording approach in which multicolor record is possible is desired, and resolution with the expensive image moreover recorded is demanded.

[0003] Usually, the melting mold thermal-transfer-recording approach which heats from behind an ink film and imprints thermofusion or softened ink in a regular paper as the record approach of an image is learned. This melting mold thermal-transfer-recording approach imprints the ink of an ink film in a regular paper, and is suitable for record of binary images, such as an alphabetic character and a line drawing. JP,3-219969,A is one of those were indicated about this melting mold thermal-transfer-recording approach. The width of face of the recording paper conveyance direction (henceforth the direction of vertical scanning) the record approach proposed in this This and the direction of a right angle The direction width of face of vertical scanning of a heater element is made into a unit recording width using the thermal head equipped with the heater element narrower than the die length of (calling it a main scanning direction hereafter). Carrying out the intermittent feed of this unit recording-width [ every ] detail paper, each heater element is energized according to image data, the record area within 1 record pixel (dot) is changed, and it is made to perform a gradation expression.

[0004] However, since the width of face in the direction of vertical scanning of a heater element is a unit recording width by the above-mentioned record approach, in order to raise the gradation nature of a record pixel, it was difficult to narrow width of face of the direction of vertical scanning of a heater element, and for there to be a limitation in respect of the endurance of a thermal head, and a manufacturing cost, and to obtain higher gradation nature. Then, as the melting mold thermal-transfer-recording approach improved further, there is JP,4-19163,A, and the melting mold thermal-transfer-recording approach which can record the image equipped with high gradation nature is proposed, without narrowing width of face of a heater element specially.

[0005] That is, while carrying out unit delivery width-of-face [ every ] intermittent migration of the thermal head relatively to the recording paper, he makes this unit delivery width of face narrower than the width of face of the direction of vertical scanning of a heater element, and is trying to change the recording width of the direction of vertical scanning according to the concentration of the pixel which should drive and record a heater element for every unit delivery width of face. Since this drives according to the concentration which is the pixel which a heater element should record for every unit delivery width of face, a recording width will change by width of face narrower than the width of face of a heater element. Therefore, image recording of the Takashina tone can be performed, without using a heater element with narrow width of face specially.

[0006] As shown in drawing 4 and drawing 5 , in the above-mentioned melting mold thermal-transfer-recording approach, the pixel of the square of length and each 122 micrometers wide is arranged for the pixel 1 which becomes juxtaposition from two or more micro lines 1a-1n in the direction of vertical scanning in the shape of a matrix in 2-micrometer pitch, and the predetermined image 2 is formed. With the micro lines 1a-1e of a pixel 1, generate heat the heater element of a thermal head, and it is made not to generate heat with the micro lines 1f-1n below it on the occasion of formation of this image 2. He is trying to form the predetermined image 2 by a drive and generation of heat of the heater element of a thermal head so that each record pixels 1A and 1B and Rhine which carries out sequential generation of heat of the micro line of ... in the direction of vertical scanning 1 C may increase according to the concentration of an image 2.

[0007] Therefore, by selecting each record pixels 1A and 1B and the micro line number recorded corresponding to the concentration of an image 2 among the micro lines 1a-1n of ... 1 C By combining the record pixel of several kinds of different gradation, as the surface ratio of the part generating heat and the part not generating heat differs A halftone part also realizes a certain area gradation, and forms one image 2 as a whole, and although the delivery resolution of the direction of vertical scanning is low, an image with gradation nature is obtained.

[0008]

[Problem(s) to be Solved by the Invention] However, each record pixels 1A, 1B, and 1C which form an image 2 by the above conventional melting mold thermal-transfer-recording approaches ... As it does not generate heat, he is trying to form an image with high resolution with a downward micro line, as sequential generation

of heat is carried out in inside from the upper part of two or more micro lines of the arbitration of the micro lines 1a-1n. Therefore, when forming an alphabetic character, especially the slanting part 3 of an alphabetic character will be expressed with black or white per pixel, and the record pixels 1A and 1B of arbitration and level difference 3a of the part with which ... is connected 1 C will generate it by at least 1 pixel. For this reason, the resolution when writing an alphabetic character became low, and when carrying out alphabetic character formation, it has left the problem. This invention aims at offering the image recording approach and equipment which can record the alphabetic character of high resolution while it can record the gradation image of high quality.

[0009]

[Means for Solving the Problem] The above-mentioned purpose concerning this invention realizes area gradation of an image by forming 1 pixel with micro line two or more books, and setting up the number of the predetermined micro line in each record pixel according to the concentration information on an image. It is attained by the image recording approach characterized by selecting the micro line in each record pixel for each of two or more micro lines in the recording paper conveyance direction at arbitration according to the configuration information on an alphabetic character as a unit pixel in 1 pixel, and forming an alphabetic character.

[0010] Moreover, the above-mentioned purpose is attained when record of said image and an alphabetic character part is recorded by thermal recording.

[0011] Furthermore, the above-mentioned purpose realizes the area gradation of an image, and is attained by the image-recording approach characterized by to select the micro line in each record pixel in the recording paper conveyance direction at arbitration, and to form an alphabetic character by making into a unit pixel the number of micro lines smaller than the number of micro lines which forms 1 pixel by forming 1 pixel with micro line two or more books, and selecting the number of the predetermined micro line of each record pixel according to the concentration of an image.

[0012] In addition, the above-mentioned purpose is attained by the image recording equipment characterized by consisting of a conversion means to change ON / off setup of a heater element drive of a thermal head on a micro line by whether it is image data or it is alphabetic data, an amendment means to amend the drive time amount of said heater element, and a strobe signal generating means to direct the drive time amount of said heater element.

[0013]

[Function] According to the above-mentioned configuration, according to the concentration information on an image, the number of the predetermined micro line in each record pixel is selected, area gradation is realized, an image is formed, the number of the micro line used as the unit pixel in 1 pixel is selected at arbitration according to the configuration information on an alphabetic character in the recording paper conveyance direction, and an alphabetic character is formed. Therefore, in addition to a gradation image being recorded, record of the alphabetic character of high resolution is attained.

[0014] Moreover, the melting mold thermal transfer recording which imprints the

heat coloring record which heats a thermographic recording paper and is made to color according to heat energy, and ink in a regular paper, the sublimation mold imprint record which is made to carry out thermal diffusion of the ink to the television layer of the recording paper, and records it on it further are attained by carrying out thermal recording of an image and the alphabetic character part.

[0015] Furthermore, according to the concentration information on an image, the number of the predetermined micro line in each record pixel is selected, the micro line of each record pixel is selected in the recording paper conveyance direction at arbitration according to the configuration information on an alphabetic character by making into the number conclusion \*\*\*\*\* pixel of arbitration the number of micro lines which realizes area gradation, forms an image and forms 1 pixel, and an alphabetic character is formed. Therefore, in addition to a gradation image being formed, formation of the alphabetic character of high resolution is attained.

[0016] In addition, by the conversion means, ON / off setup of the heater element drive on the predetermined micro line which forms 1 pixel by whether it is image data or it is alphabetic data are changed, the drive time amount of the heater element which carries out an ON drive is amended with an amendment means, according to the amended drive time amount, the drive time amount of a heater element is directed by the strobe signal generating means, and the ON drive of a heater element is carried out.

[0017]

[Embodiment of the Invention] Hereafter, the detail of the embodiment of this invention is explained. In addition, it cannot be overemphasized that this invention is not what is limited to this embodiment.

[0018] As shown in drawing 1 , the block diagram about the image recording approach and equipment concerning this invention is shown. A/D conversion of the picture signal of each pixel incorporated from the TV camera, the scanner, etc. is carried out, and alphabetic data is changed into the binary alphabetic data showing white or black, and it is stored in RAM in CPU11 (not shown). At the time of record, the gradation image data read from RAM in CPU11 is incorporated by the translation table 12 to a micro line number. Moreover, binary alphabetic data is inputted into OR circuit 13. As it is drawing 4 and are already stated, and each record pixel which constitutes the gradation image data inputted into a translation table 12 arranges two or more micro lines 1a-1n to juxtaposition and forms 1 pixel in the direction of vertical scanning, it changes it into the data of micro line two or more books.

[0019] The image data from which the micro line number of each record pixel was changed with this translation table 12 is sent to OR circuit 13. OR circuit 13 takes OR of the image data from a translation table 12, and the binary alphabetic data from CPU11, and it outputs image data and binary data to a buffer 14 as superposition and record data, and he is trying to memorize them temporarily there. That is, OR circuit 13 piles up image data and alphabetic data, and serves as a conversion means to change ON / off setup of a heater element drive of the thermal head 17 on a micro line.

[0020] The record data memorized by the buffer 14 are transmitted to the

amendment table 15, and are made to perform the so-called hysteresis amendment, contiguity amendment, etc. And it becomes an amendment means to output amendment data to the strobe generating means 16, i.e., a strobe generating circuit.

[0021] The strobe generating circuit 16 directs the heating time of the heater element arranged in the predetermined pitch in the main scanning direction of a thermal head 17 at the single tier to this thermal head, generates the strobe signal of the shape of a pulse as a control signal, and he is trying to output it to a thermal head 17.

[0022] Next, an operation of the image recording equipment constituted as mentioned above is used together, and the flow chart of drawing 2 is explained. At the time of record, the gradation image data written in RAM of CPU11 is read from RAM of CPU11 at step S1, and it incorporates to a translation table 12 at it. This translation table 12 is changed into the data of micro line two or more books which form each record pixel of gradation image data. The image data changed with the translation table 12 and the binary alphabetic data read from RAM of CPU11 are sent to OR circuit 13 at step S2. Each record pixel of binary alphabetic data arranges and forms several micro lines in the direction of vertical scanning, and is formed in micro line resolution.

[0023] OR circuit 13 takes OR of the image data and binary alphabetic data which were changed into the data corresponding to micro line two or more books with the translation table 12. And ON / OFF of a drive of the heater element on the micro line of each record pixel, i.e., that setup which generates heat a heater element or does not generate heat, is performed, and it transmits to a buffer 14 as record data recorded on record media, such as a sensible-heat film, and memorizes temporarily there.

[0024] If printing speed becomes quick at the time of record by the heater element of a thermal head, temperature of a heater element cannot be enough fallen by the time of record of the next micro line from record of the micro line of the beginning of each record pixel. Therefore, it the temperature of a heater element heats an adjoining micro line in the condition of not falling to predetermined temperature, a blot and concentration change are produced and exact record becomes impossible.

[0025] Then, the amendment table 15 amends drive time amount of a heater element at step S5, and a strobe signal is impressed to a thermal head 17 from the strobe generating circuit 16 with the amendment data. This strobe generating circuit 16 outputs a pulse-like strobe signal to a thermal head 17 by step S4, in order to direct the exoergic time amount of the heater element of a thermal head 17 based on amendment data. Thereby, the time amount drive of the heater element is directed and carried out, and record of an image and an alphabetic character part is formed in the record medium in high resolution. It distinguishes whether they are whether this strobe signal was impressed to the thermal head 17, and no at step S6. And distinction of that the strobe signal was outputted performs processing of step S5 again. Hereafter, by the count equal to the number of micro lines, processing of the step S5 => step S4=> step S6 => step S5 is repeated, and record of the unit pixel of a record pixel is performed to a record



medium one by one.

[0026] Thus, the part of an image 2 forms a unit pixel with micro line two or more books, and area gradation of an image is realized by selecting the number of the predetermined micro line of each record pixel according to the concentration of an image. Moreover, since the alphabetic character part selected the micro line in each record pixel for two or more micro lines as a unit pixel in 1 pixel at arbitration according to the configuration of an alphabetic character in the direction of vertical scanning, respectively, a high-definition alphabetic character can be recorded, with image quality maintained.

[0027] Next, the record situation to the record medium by the alphabetic data amended on the amendment table 15 by drawing 3 is explained. At this example, length and the record pixel of the dimension of each 122 micrometers wide are arranged in the shape of a matrix by pitch 2micrometer. each record pixels 1A and 1B of an image 2 ... 1 C It is formed with micro line two or more books, respectively. The inside of the two or more micro lines, whether according to the concentration of an image, the micro line from the upper part to how many generates heat with a translation table 12 sets up -- having -- drawing -- a micro line -- caudad -- going -- carrying out -- \*\* -- that is, it is set up so that a sequential exoergic part may increase according to the direction of vertical scanning.

[0028] The slanting part 10 of an alphabetic character makes a unit pixel the record pixels 1A and 1B and each two or more micro lines which form ... 1 C on the amendment table 15, and it leaves 1 thru/or about two lower micro lines about the part of record pixel 1A, and it is set up so that all other micro lines may be made to generate heat. Moreover, the record pixels 1B and 1C make all micro lines generate heat, record pixel 1D makes the micro line of lower one half generate heat, record pixel 1E makes the micro line of up one half generate heat, and the micro line of lower one half is set up so that it may not be made to generate heat. That is, arbitration can be made to heat by the heater element of a thermal head with any micro line of each record pixel according to the configuration information on the alphabetic character recorded on a record medium. Thereby, between the contiguity record pixels of the slanting part 4 of an alphabetic character, level difference 4a becomes small, becomes a configuration near an abbreviation curve, and can record the alphabetic character of high vertical-scanning resolution.

[0029] In addition, this invention is not limited to the above-mentioned example, a number smaller than the number of micro lines in which an alphabetic character part forms 1 pixel of micro lines are made into a unit pixel, few of the micro line is selected in the direction of vertical scanning at arbitration, and you may make it record an alphabetic character. That is, even if it sets [ the micro line of the pixel explained in said example ] up the width of face of a micro line greatly rather than the micro line of said example as one micro line for two or more and makes the number of micro lines decrease, the same effectiveness as said example is done so.

[0030] Furthermore, although the case where record of an image and an alphabetic character was performed was explained by the melting mold thermal-

transfer-recording approach in the above-mentioned example Monochrome thermal paper for [ as a record medium ] a color thermal paper, facsimile, and word processors, Are recordable on the sensible-heat film (for example, the Fuji Photo Film make, the sensible-heat film for FTI) of medical application etc. Moreover, while changing the die length in the direction of vertical scanning of the ink dot recorded in a pixel according to concentration using the recording head which arranged two or more record pixels to the main scanning direction It is applicable to the color hot printing which records a color picture on the recording paper by yellow, the Magenta, and three kinds of ink dots of cyanogen at least. Moreover, it is applicable also to the area gradation record of those other than the thermal recording recorded on pavement with the zebra zone record machine which used a laser beam printer, a liquid crystal shutter line printer, an ink injection printer, and low melting glass.

[0031] Furthermore, if it can be burned on a silver salt sensitized material by the light or infrared light while improvement in the speed of an offset-printing process, laborsaving, and dry-ization can be attained, if hot printing of the ink sheet which absorbs black or ultraviolet rays on a transparent sheet by the image recording approach of this invention is carried out, it is recorded, this is used as a lith film and it can be burned on a PS plate by ultraviolet radiation, improvement in the speed of alphabetic character ON \*\*\*\*\* to a photograph, laborsaving, and dry-ization can be attained. In addition, the latter can also use the transparence sensible-heat film of the above-mentioned medical application.

[0032]

[Effect of the Invention] As explained above, area gradation of a record image is realized by according to this invention, forming 1 pixel with micro line two or more books, and selecting the number of a micro line, and the micro line in each pixel is selected in the recording paper conveyance direction as a unit pixel in 1 pixel at arbitration according to the configuration information on an alphabetic character, and alphabetic character formation of each of two or more micro lines is carried out. Thereby, a high-definition alphabetic character part can be recorded, with image quality maintained.

---

[Translation done.]

## \* NOTICES \*

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

## DESCRIPTION OF DRAWINGS

---

### [Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the configuration of the image recording approach and equipment which are one embodiment of this invention.

[Drawing 2] It is the flow chart which shows the flow of the actuation at the time of record of the image recording equipment of this invention.

[Drawing 3] It is the explanatory view showing the selection situation of the micro line of each record pixel at the time of record of the slanting part of the alphabetic character by this invention.

[Drawing 4] It is the explanatory view of the pixel formed with two or more micro lines.

[Drawing 5] It is the explanatory view showing the record condition of the slanting part of the alphabetic character by conventional image recording equipment.

### [Description of Notations]

1 Pixel

1A, 1B, 1C Record pixel

1a, 1b, 1c Micro line

2 Image

10 Slanting Part of Alphabetic Character

11 CPU

12 Translation Table

13 OR Circuit

14 Buffer

15 Amendment Table

16 Strobe Generating Circuit

17 Thermal Head

---

[Translation done.]

## \* NOTICES \*

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\*\* shows the word which can not be translated.

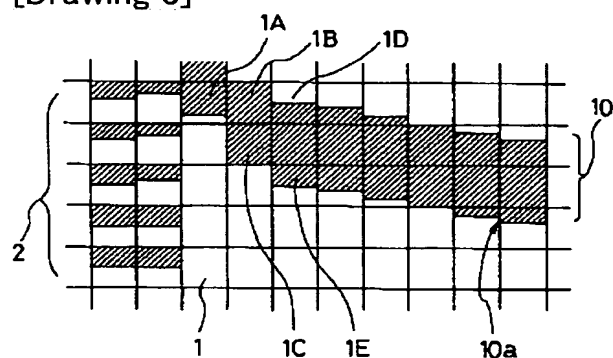
3.In the drawings, any words are not translated.

---

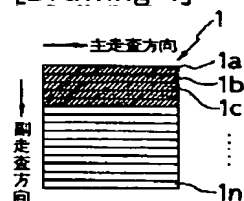
## DRAWINGS

---

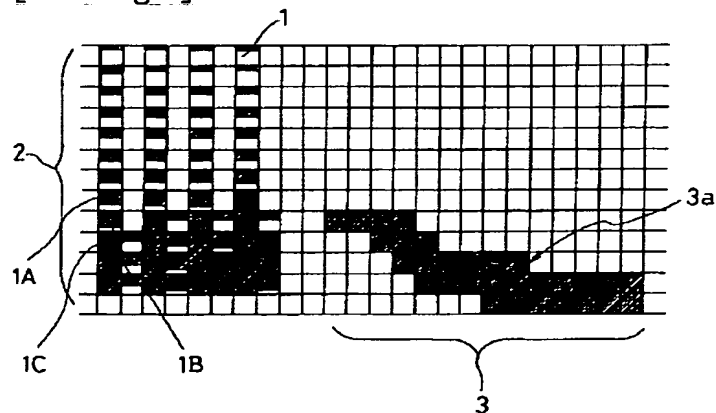
[Drawing 3]



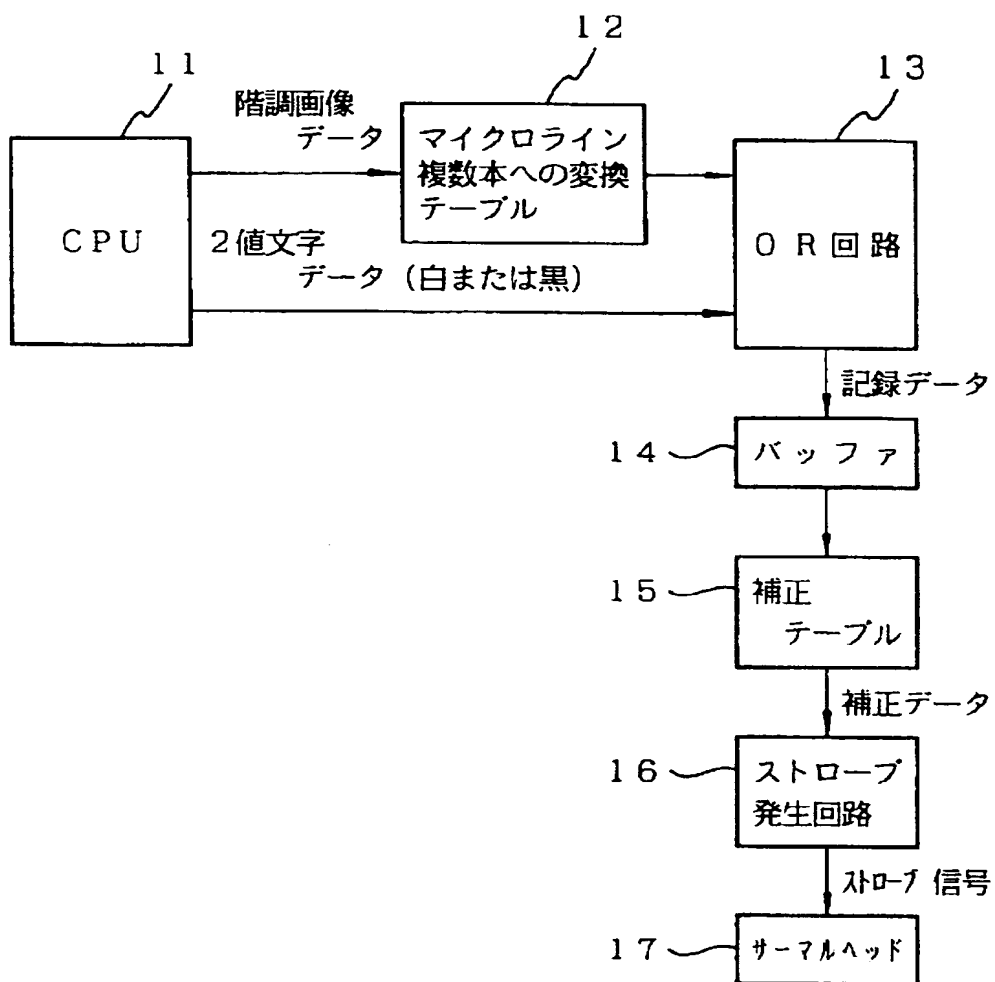
[Drawing 4]



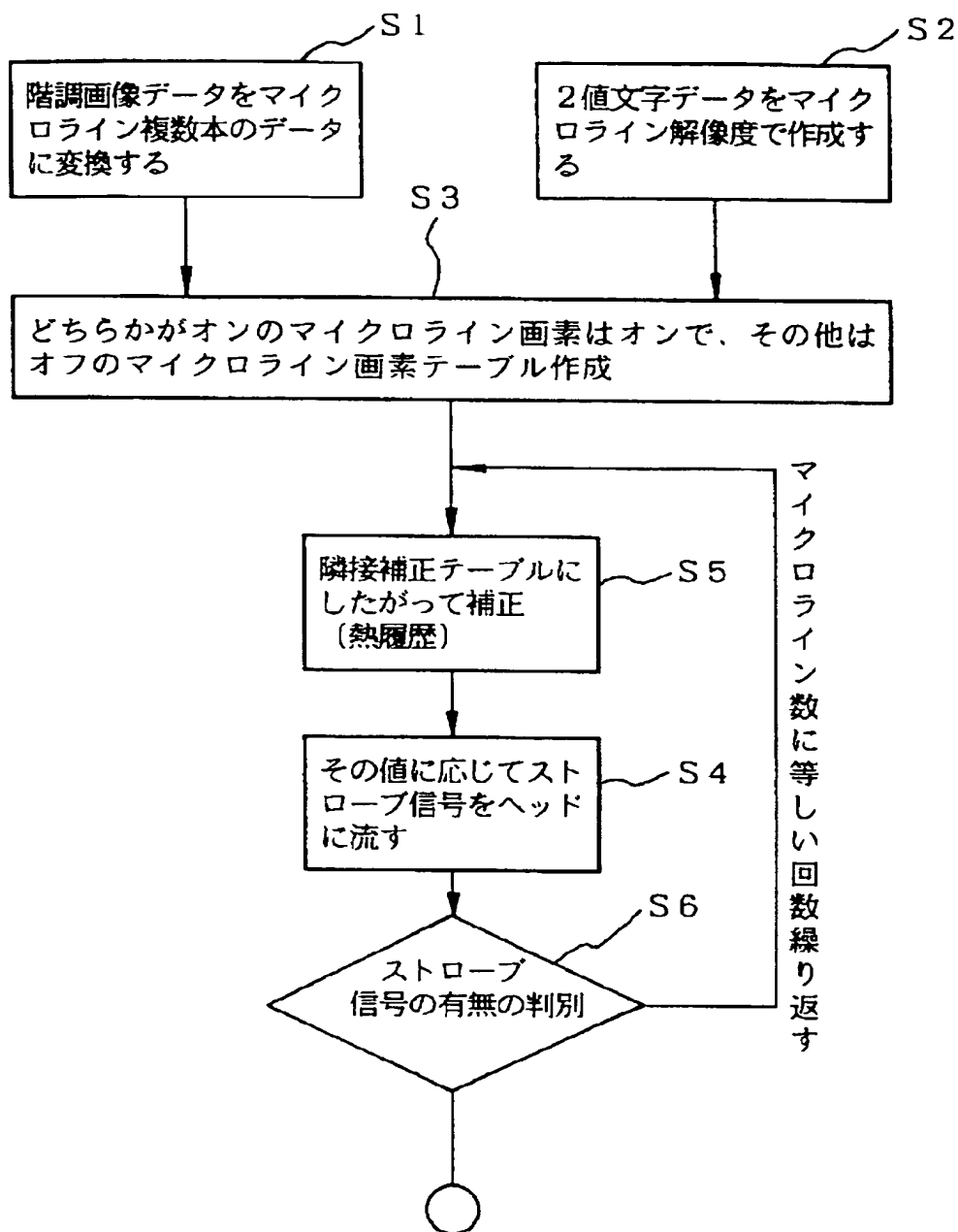
[Drawing 5]



[Drawing 1]



[Drawing 2]



[Translation done.]